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A STUDY OF PHYSICO CHEMICAL PARAMETERS OF WASTE WATER OF OLIVE OIL REFINERY, LUNKARANSAR, BIKANER, RAJASTHAN, INDIA

ARTI ASERI, SUSHMA JAIN AND ANURADHA ASERI

PG Department of Chemistry, Govt. Dungar College, Bikaner 334 003, India

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ABSTRACT

The olive oil refinery is situated at Lunkaransar tehsil of Bikaner. The cold press method is used for oil extraction, which generates 20 to 25% olive oil and 75 to 80% waste water and solid waste. This waste water and solid waste has spread out in nearby agriculture land. So, to find out whether this waste water is useful or not, we have made an attempt to analyze the waste water. For this purpose, we have analyzed the physico-chemical parameters like pH, EC, Turbidity, BOD, COD, Na^+, K^+, Ca^{+2}, Mg^{+2} of olive oil waste water. The samples were collected from the origin site of refinery. The analyses of pH, EC were determined by Potentiometric method. BOD, COD were analyzed by titrimetric method. Metal ions Ca^{+2}, Mg^{+2} were determined by EDTA titrimetric method and Na^+, K^+ by flame photometer. The results showed that pH of sample is very acidic (3.7 to 4.1 range). EC value is quite higher. Metal ions like Na^+, K^+ are present in large quantities.

KEYWORD : Olive oil waste water, pH, EC, BOD, COD.

INTRODUCTION

India's first olive oil refinery is located in Lunkaransar (Bikaner), Rajasthan. Here, every year olive oil is produced from olive fruits. There are 7 olive fruits varieties are cultivated: *Arbequina, Koroneiki, Coratina, Frantoio, Barnea.* The cold press method is used to extract olive oil. Olive fruits are first washed with about 3000-4000 liter of water daily. Now, grind the washed fruits by putting them in oil drain motor. In this motor, olive oil is extracted by pressing the fruits. Oil and water mixture, and olive solid waste are separated. Now oil is separated from the mixture, waste water is left behind. The waste water is discharged in to open land area behind the refinery through a pipe. Waste solid are also deposited back side of the refinery through a separate pipe. From one ton of olive fruits, 20% of oil is extracted and 5000-6000 liter of waste water is generated. Olive oil production is done in the refinery from September to November month every year. In this way a lot of waste water is generated in oil production. By putting such a large amount of waste water in the open dig, a lot of waste water starts collecting in this open pit. Some amount of water goes nearby agricultural olive fruit production land area, some water goes down to the drain and the rest of the water remains in the soil surface by making a mixture with olive solid waste cake. The colour of the wastewater is red brown. It contains nutrients, minerals and organic matter (Leila El Bassi *et al.*, 2020[8]). In this paper, the physico- chemical properties of olive oil wastewater of the refinery has studied.

MATERIALS AND METHODS

Fresh sample about 10 l have been collected from the refinery. The waste water sampling is taken from the origin area. The sample from origin site is collected in the month of September and October for the study. All samples have been collected in washed and sealed bottles.

Following parameters have been used for Olive oil waste water analysis experiment:

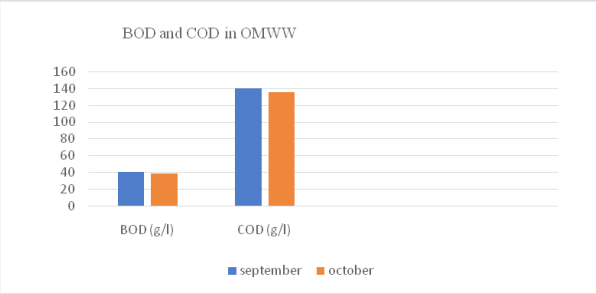
S.No.	Parameters	Analytical Method
1.	pH	pH meter
2.	EC (ms/cm)	EC meter
3.	Turbidity (NTU)	Turbidity meter
4.	BOD (g/l)	Titrimetric method
5.	COD (g/l)	Titrimetric method
6.	Na^{+} (g/l)	Flame photometer
7.	K^{+} (g/l)	Flame photometer
8.	Ca^{+2} (mg/l)	EDTA titrimetric method
9.	Mg^{+2} (mg/l)	EDTA titrimetric method
10.	TOC (g/l)	Dry combustion method
11.	NO_3^- (mg/l)	Molecular absorption spectroscopy method
12.	Cl^- (mg/l)	Titrimetric method

RESULTS AND DISCUSSION

Physico Chemical Analysis of Olive Oil Waste Water

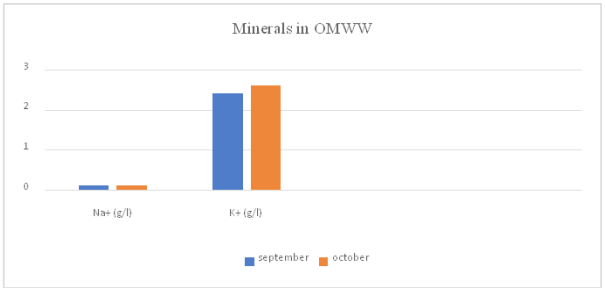
S.No.	Parameter	September	October
1)	pH	3.7	4.1
2)	EC (ms/cm)	14	13
3)	Turbidity (NTU)	3000	4028
4)	BOD (g/l)	40	38
5)	COD (g/l)	140	135
6)	Na^{+} (g/l)	0.1	0.1
7)	K^{+} (g/l)	2.4	2.6
8)	Ca^{+2} (mg/l)	<5	<5
9)	Mg^{+2} (mg/l)	<5	<5
10)	TOC (g/l)	20.1	21.4
11)	NO_3^- (mg/l)	11.1	10.5
12)	Cl^- (mg/l)	50	58

The olive oil waste water pH is very low it ranges b/w 3.7-4.1. so we can say that it is very acidic in nature. EC value is quite high. It is 13-14 ms/cm, which shows that the concentration of dissolved minerals are present in large quantities, the waste water is full of nutrients.



Turbidity is 3000-4000 NTU. The high turbidity value showed that the olive oil waste water has suspended and colloidal particles, which are present in a large amount. We can say that the olive oil waste water is very polluted in nature.

BOD and COD value is very high. BOD is 38-40 g/l and COD is 135-140 g/l. The olive oil wastewater is rich in organic matter expressed in terms of BOD. BOD/COD (40/140) value is 0.2857. It means this waste water is mostly non-biodegradable. So we can say that the olive mill waste water is not good for the environment.



Olive mill waste water contains many mineral nutrients like sodium, potassium, nitrate in a good amount. Potassium is present in an adequate amount 2.4-2.6 g/l. It showed that the waste water is good for agricultural purpose, if we will use it after a proper treatment.

Calium and Magnesium is present in a low quantity. The chloride present in salt of sodium and potassium chloride. It is present in a sufficient amount 50-60 mg/l.

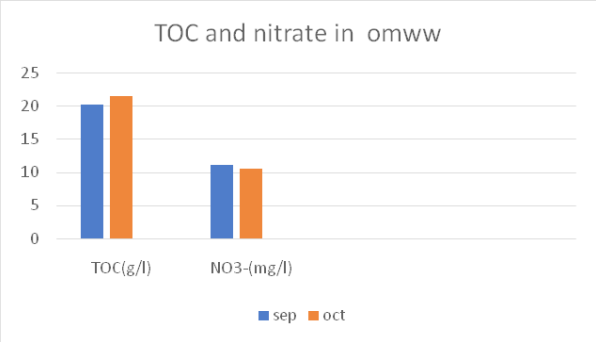
The main constituents of this waste water ispoly phenolic compound. The polyphenolic concentration of the olive oil waste water is high (Younes Dehmani *et al.*, 2020). Our experimental study showed that the TOC concentration of olive oil waste water is 20.1-21.4 g/l. The waste water is highly polluted and it contains carbon in a huge amount. The total organic carbon is present in the form of carbohydrates, phenols, protein substances. So we can say that it is highly toxic, which is not good for the environment. Tyrosol and hydroxytyrosol compounds are present in major quantities in olive oil waste water, (Elena De Marco *et al.*, 2007). We should recycle the waste water and this high conc of phenolic compounds can be used in many manufacturing processes like pharmaceutical industries, resins, biofuel (Patrick Dutournie, 2019) and biochar units (Laura Delgado *at al.*, 2021).

CONCLUSION

The olive oil waste water collected from the olive oil refinery Lunkaransar is very complex physico chemical composition. It contains large amount of

total organic compound, which causes environmental problems for the ecosystem. The BOD and COD value is high, which showed that the waste water is very polluted. Potassium and other mineral nutrients are present in a good amount. So it may become a positive economic value for the agricultural purpose, If we use it after a proper treatment process. The future study, we will do the microbial analysis of the olive oil waste water, which also will clear the entire characteristics of the waste water.

Conflict of Interest- None



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